1416.4.2.2 Commissioning Reports

1416.4.2.2.1 Preliminary Commissioning Report: A preliminary commissioning report of test procedures and results shall be prepared. The preliminary report shall identify:

1. Deficiencies found during testing required by this section which have not been corrected at the time of report preparation and the anticipated date of correction.
2. Deferred tests which cannot be performed at the time of report preparation due to climatic conditions.
3. Climatic conditions required for performance of the deferred tests, and the anticipated date of each deferred test.

1416.4.2.2.2 Final Commissioning Report: A complete report of test procedures and results shall be prepared and filed with the owner.

1416.4.2.3 Acceptance: Buildings or portions thereof, required by this code to comply with this section, shall not be issued a final certificate of occupancy until such time that the building official determines that the preliminary commissioning report required by this section has been completed.

SECTION 1420 — SIMPLE SYSTEMS (Packaged Unitary Equipment)

1421 System Type: To qualify as a simple system, systems shall be one of the following:

a. Air cooled, constant volume packaged equipment, which provide heating, cooling or both, and require only external connection to duct work and energy services.

b. Air cooled, constant volume split systems, which provide heating, cooling or both, with cooling capacity of 84,000 Btu/h or less.

c. Heating only systems which have a capacity of less than 5,000 cfm or which have a minimum outside air supply of less than 70% of the total air circulation.

All other systems shall comply with Sections 1430 through 1439.

1422 Controls: In addition to the control requirements in Section 1412, where separate heating and cooling equipment serve the same temperature zone, thermostats shall be interlocked to prevent simultaneous heating and cooling. Systems which provide heating and cooling simultaneously to a zone are prohibited.

1423 Economizers: Economizers meeting the requirements of Section 1413 shall be installed on:

a. cooling units installed outdoors or in a mechanical room adjacent to outdoors having a total cooling capacity greater than 20,000 Btu/h including those serving computer server rooms, electronic equipment, radio equipment, and telephone switchgear; and

b. other cooling units with a total cooling capacity greater than 54,000 Btu/h, including those serving computer server rooms, electronic equipment, radio equipment, and telephone switchgear.

EXCEPTION: For Group R Occupancy, economizers meeting the requirement of Section 1413 shall be installed on single package unitary fan-cooling units having a total cooling capacity greater than 54,000Btu/h.

The total capacity of all units without economizers (i.e., those units with a total cooling capacity less than a and b above) shall not exceed 240,000 Btu/h per building, or 10% of its aggregate cooling (economizer) capacity, whichever is greater. That portion of the equipment serving Group R occupancy is not included in determining the total capacity of all units without economizers in a building.

SECTION 1430 — COMPLEX SYSTEMS

1431 System Type: All systems not qualifying for Sections 1420 through 1424 (Simple Systems), including field fabricated and constructed of system components, shall comply with Sections 1430 through 1439. Simple systems may also comply with Sections 1430 through 1439.

1431.1 Field-Assembled Equipment and Components: Field-assembled equipment and components from more than one manufacturer shall show compliance with this section and Section 1411 through calculations of total on-site energy input and output. The combined component efficiencies as measured per Section 1411.2, shall be in compliance with the requirements of Section 1411.1.

Total on-site energy input to the equipment shall be determined by combining the energy inputs to all components, elements and accessories such as compressors, internal circulating pumps, purge devices, viscosity control heaters and controls.

1432 Controls

1432.1 Setback and Shut-Off: Systems that serve zones with different uses, as defined in Table 15-1,

1. shall be served by separate systems, or
2. shall include isolation devices and controls to shut-off or set back the supply of heating and cooling to each zone independently.

EXCEPTION: Isolation or separate systems are not required for zones expected to operate continuously or expected to be inoperative only when all other zones are inoperative.

1432.2 Systems Temperature Reset Controls

1432.2.1 Air Systems for Multiple Zones: Systems supplying heated or cooled air to multiple zones shall include controls which automatically reset supply air temperatures by representative building loads or by outside air temperature. Temperature shall be reset by at least 25% of the design supply-air-to-room-air temperature difference.

EXCEPTION: Where specified humidity levels are required to satisfy process needs, such as computer rooms or museums.

1432.2.2 Hydronic Systems: Systems with a design capacity of 600,000 Btu/h or greater supplying heated water to comfort conditioning systems shall include controls which automatically reset supply water temperatures by representative building loads (including return water temperature) or by outside air temperature. Temperature shall be reset by at least 25% of the design supply-to-return water temperature differences.

1433 Economizers: Air economizers meeting the requirements of Section 1413 shall be provided on all new systems including those serving computer server rooms, electronic equipment, radio equipment, telephone switchgear.

EXCEPTIONS: 1. High-efficiency cooling units with EER values more than 10% higher than minimum efficiencies listed in Tables 14-1A, 14-1B and 14-1D, in the appropriate size category, using the same test procedures. The total capacity of all systems without economizers shall not exceed 480,000 Btu/h per building, or 20% of its air economizer capacity, whichever is greater. That portion of the equipment serving Group R Occupancy is not included in determining the total capacity of all units without economizers in a building. This exception shall not be used for RS-29 analysis nor include unitary cooling equipment installed outdoors nor in a mechanical room adjacent to outdoors.

2. Water-cooled refrigeration equipment provided with a water economizer meeting the requirements of Section 1413. Water economizer capacity per building shall not exceed 500 tons. This exception shall not be used for RS-29 analysis.

3. Systems for which at least 75% of the annual energy used for mechanical cooling is provided from site-recovery or site-solar energy source.

4. Systems where special outside air filtration and treatment, for the reduction and treatment of unusual outdoor contaminants, makes an air economizer infeasible.

5. Systems that affect other systems (such as dehumidification and supermarket refrigeration systems) so as to increase the overall building energy consumption. New humidification equipment shall comply with Section 1413.4.

6. Systems complying with all of the following criteria:

a. Consist of multiple water source heat pumps connected to a common water loop;

b. Have a minimum of 60% air economizer;

c. Have water source heat pumps with an EER at least 15% higher for cooling and a COP at least 15% higher for heating than that specified in Section 1411;

d. Where provided, have a central boiler or furnace efficiency of:

i. 90% minimum for units up to 199,000 Btu/h; and

ii. 85% minimum for units above 199,000 Btu/h input; and

e. Provide heat recovery with a minimum 50% heat recovery effectiveness as defined in Section 1436 to preheat the outside air supply.

7. For Group R Occupancy, cooling units installed outdoors or in a mechanical room adjacent to outdoors with a total cooling capacity less than 20,000 Btu/h and other cooling units with a total cooling capacity less than 54,000 Btu/h.

1434 Separate Air Distribution Systems: Zones with special process temperature requirements and/or humidity requirements shall be served by separate air distribution systems from those serving zones requiring only comfort conditions; or shall include supplementary control provisions so that the primary systems may be specifically controlled for comfort purposes only.

EXCEPTION: Zones requiring only comfort heating or comfort cooling that are served by a system primarily used for process temperature and humidity control provided that:

1. The total supply air to those comfort zones is no more that 25% of the total system supply air, or
2. The total conditioned floor area of the zones is less than 1,000 square feet.

1435 Simultaneous Heating and Cooling: Systems which provide heating and cooling simultaneously to a zone are prohibited. Zone thermostatic and humidistatic controls shall be capable of operating in sequence the supply of heating and cooling energy to the zone. Such controls shall prevent:

a. Reheating for temperature control.

b. Recooling for temperature control.

c. Mixing or simultaneous supply of air that has been previously mechanically heated and air that has been previously cooled, either by economizer systems or by mechanical refrigeration.

d. Other simultaneous operation of heating and cooling systems to the same zone.

e. Reheating for humidity control.

EXCEPTIONS: 1. Zones for which the volume of air that is reheated, recooled, or mixed is no greater than the larger of the following:

a. The volume of air required to meet the ventilation requirements of the Washington State Ventilation and Indoor Air Quality Code for the zone.

b. 0.4 cfm/ft^2 of the zone conditioned floor area, provided that the temperature of the primary system air is, by design or through reset controls, 0-12°F below the design space heating temperature when outside air temperatures are below 60°F for reheat systems and the cold deck of mixing systems and 0-12°F above design space temperature when outside air temperatures are above 60°F for recooling systems and the hot deck of mixing systems. For multiple zone systems, each zone need not comply with this exception provided the average of all zones served by the system that have both heating and cooling ability comply.

c. 300cfm. This exception is for zones whose peak flow rate totals no more than 10% of the total fan system flow rate.

d. Any higher rate that can be demonstrated, to the satisfaction of the building official, to reduce overall system annual energy usage by offsetting reheat/recool energy losses through a reduction in outdoor air intake in accordance with the multiple space requirements defined in ASHRAE Standard 62.

2. Zones where special pressurization relationships, cross-contamination requirements, or code-required minimum circulation rates are such that variable air volume systems are impractical.

3. Zones where at least 75% of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered (including condenser heat) or site solar energy source.